Edge-Directed Cyber Technologies for Reliable Mission Communication (EdgeCT)

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8 December 2014

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DISCLAIMER

The published BAA is the official solicitation instructions that must be followed in order to submit a responsive proposal. If anything said or addressed during this presentation or in the FAQ conflicts with the published solicitation, the BAA takes precedence.

The Government may issue amendments to the BAA to effect any changes deemed necessary in response to the FAQ. Such amendments would be posted to FBO and Grants.gov prior to the solicitation closing date and would supersede previous versions of the solicitation.

BAA OVERVIEW

- BAA follows procedures in accordance with FAR 35.016.
- BAA is posted on FEDBIZOPPS at www.fbo.gov and Grants.gov at http://www.grants.gov/ (as well as amendments).
- Proposals due by 12:00 noon ET on January 27, 2015
- BAA covers all info needed to submit proposals. Follow instructions for proposal preparation and submittal.

POTENTIAL AWARD INFORMATION

- Three Technical Areas (TAs); anticipate multiple awards in TAs 1 and 3, single award in TA2.
- May submit proposals against any and all TAs, but shall not submit proposals combining TAs.
- Conflicts of interest between TA1 vs TA2/3 – Proposals submitted against multiple TAs may create a conflict that would be resolved at the Government's discretion.
- Awards may be Procurement Contracts, Cooperative Agreements or Other Transaction Agreements (OTs). No grants will be awarded.
- Program Stresses Open Exchange of Information – will utilize Associate Contractor Agreement contract clause (or similar condition in non contract awards)
- Award amounts have not been predetermined and will depend on the quality of the proposals received and the availability of funds.

BAA ELIGIBILITY

- All interested/qualified sources may respond subject to the parameters outlined in the BAA.

- Foreign organization/individuals – check all applicable Security Regulations, Export Control Laws, Non-Disclosure Agreements, and other applicable governing statutes.

- FFRDCs and Government entities
  - Subject to applicable direct competition limitations
  - Must clearly demonstrate eligibility per BAA

- Real and/or Perceived Conflicts of Interest
  - Identify any conflict
  - Include mitigation plan

PROPOSAL PREPARATION INFORMATION

- Proposals consist of two volumes – Technical and Cost.

- Volume 1 - Technical and Management
  - Volume 1 has maximum 40 page limit
  - Includes mandatory Appendix A – does not count towards page limit.
  - Includes optional Appendix B – does not count towards page limit
  - Includes optional Appendix C (TA3 only) – does count towards page limit

- Volume 2 – Cost - No page limit.

- The BAA will describe the necessary information to address in each volume –
  - Make sure to include every section identified.
  - If a section does not apply – put "None" (e.g., Animal Use – None, OCI - None)
  - Include a working/unprotected spreadsheet as part of your Cost Volume submission.
  - Review individual TA descriptions, IP and the deliverables section for submittal information

PROPOSAL PREP – INTELLECTUAL PROPERTY RIGHTS

- Government desires, at a minimum, **Government Purpose Rights** for any proposed noncommercial software and technical data. (SEE DFARS 227 for Patent, Data, and Copyrights)

- Since EdgeCT will emphasize creating and leveraging open architecture technology, IP rights and software licenses asserted by proposers are strongly encouraged to be aligned with this goal.

- Data Rights Assertions – IF asserting **less than Unlimited Rights**:
  - Provide and justify basis of assertions
  - Explain how the Government will be able to reach its program goals (including transition) within the proprietary model offered; and
  - Provide possible nonproprietary alternatives

- IF proposed solution utilizes commercial IP – submit copies of license with proposal

ITEMS TO NOTE

- Work expected NOT to be fundamental research – anticipate publication restrictions.
- Indicate in proposal whether or not the scope is believed to be fundamental on both prime and subcontractor effort
- Understand and comply with SAM, E-verify, FAPIIS, i-Edison and WAWF. Links are found in the BAA.
- Subcontracting Issues
  - Non-Small Businesses: Subcontracting Plans required for FAR-based contracts expected to exceed $650,000.
  - Subcontractor cost - Proposals must include, at a minimum, a non-proprietary, subcontractor proposal for EACH subcontractor.
  - If utilizing FFRDC, Government entity, or a foreign-owned firm as a subcontractor, submit their required eligibility information, as applicable.

ITEMS TO NOTE CONTINUED

- Proposals must be valid for a minimum of 120 days
- If a prospective proposer believes a conflict of interest exists or has a question on what constitutes a conflict - promptly raise the issue with DARPA
- Document files must be in .pdf, .odx, .doc, .docx, .xls, and/or .xlsx formats.
- Submissions must be written in English.

PROPOSAL SUBMISSION

- TAs 1 and 2 submissions will be UNCLASSIFIED - classified submissions will NOT be accepted. TA3 submissions will be unclassified with the exception of Appendix C. Appendix C must be received before the BAA proposal submission dead line.
- Follow submission procedures outlined in the BAA. DO NOT submit proposals except as outlined in the BAA (e.g., email/fax submissions will NOT be accepted).
- Use single method (TA3 Appendix C exception noted)
- Use DARPA's web-based upload system for all unclassified proposals requesting a procurement contract or OT. Submission must be in a single zip file not exceeding 50 MB.
- Submit Cooperative Agreement proposals via Grants.gov.
- DO NOT wait until the last minute to submit proposals – the submission deadlines as outlined in the BAA will be strictly enforced

EVALUATION / AWARD

- No common Statement of Work - Proposal evaluated on individual merit and relevance as it relates to the stated research goals/objectives

- Evaluation Criteria (listed in descending order of importance) are: (a) Overall Scientific and Technical Merit; (b) Potential Contribution and Relevance to the DARPA Mission; and (c) Cost Realism.

- Evaluation done by scientific/technical review process. DARPA SETAs with NDAs may assist in process.

- Government reserves the right to select for award all, some, or none of the proposals received, to award portions of a proposal, and to award with or without discussions.

COMMUNICATION

- Prior to Receipt of Proposals – No restrictions, however Gov't (PM/PCO) shall not dictate solutions or transfer technology. Unclassified FAQs will be periodically posted to this BAA's DARPA web page.

- After Receipt of Proposals – Prior to Selection: Limited to PCO – typical communication to address proposal clarifications.

- After Selection/Prior to Award: Communications range from technical clarifications/revisions to formal cost negotiations. May involve technical as well as contracting staff.

- Informal feedback for proposals not selected for funding may be provided once the selection(s), if any, are made.

- **Only a duly authorized Contracting Officer may obligate the Government**

TAKE AWAY

- Submit proposals before the due date/time - Do NOT wait until the last minute to submit.
- Read and understand the BAA - Follow the BAA when preparing proposals.
- Be familiar with Government IP terms from the DFARS Part 227.
- Submit working/unprotected spreadsheet(s).
- The Contracting Officer is the only Government official authorized to obligate the Government.

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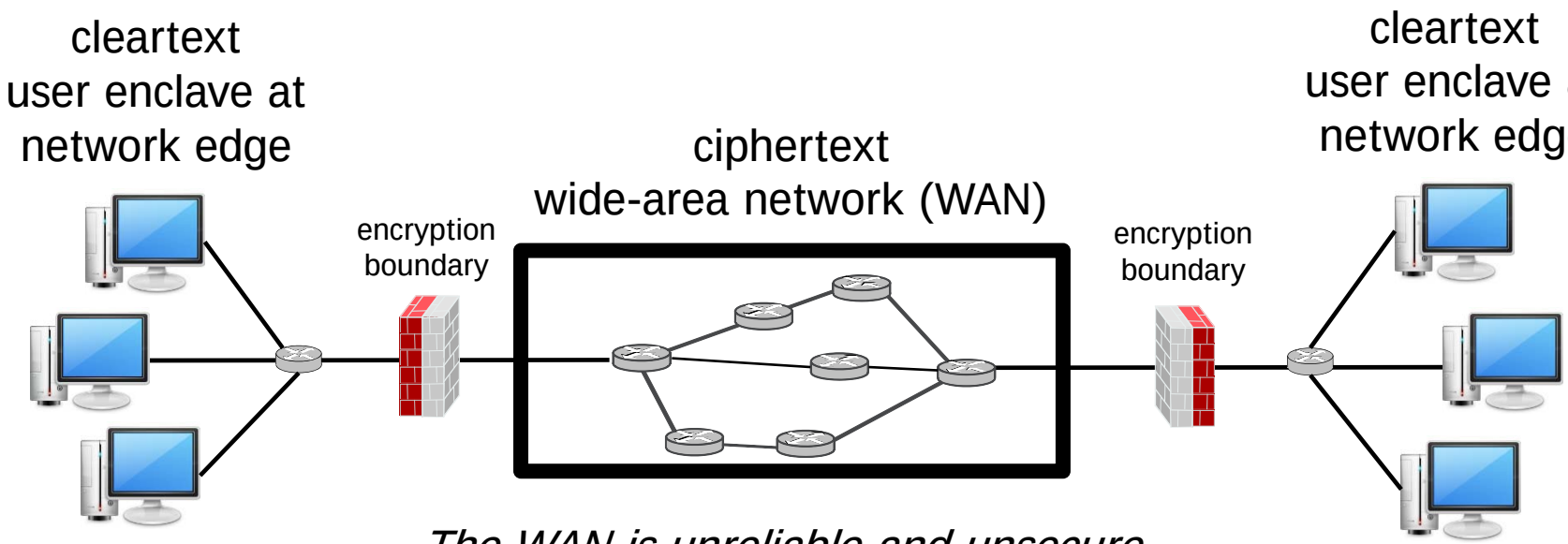
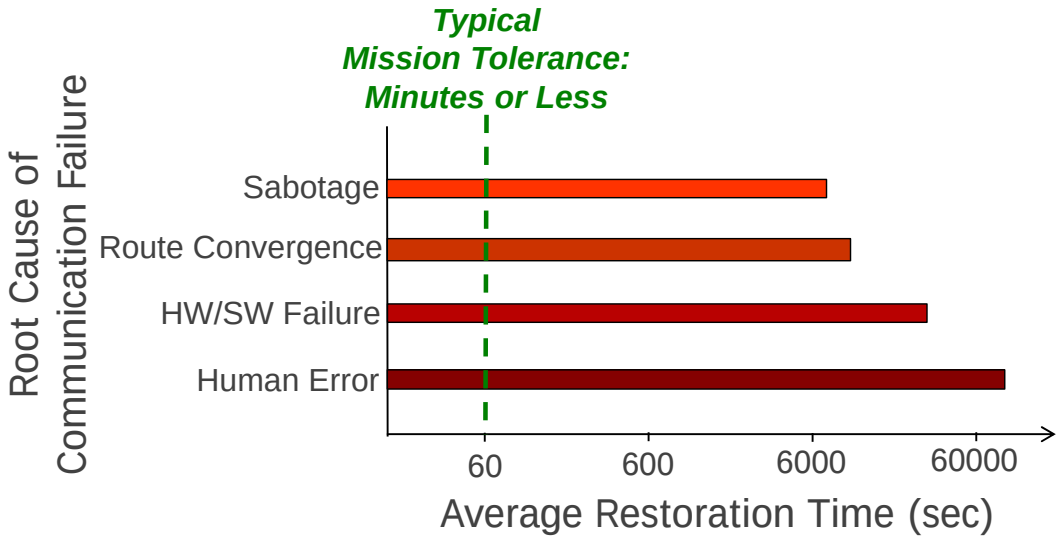
EdgeCT Problem Context



The WAN is unreliable and unsecure.

It is a "black box" from the users' standpoint.

Predicaments for Missions and Users

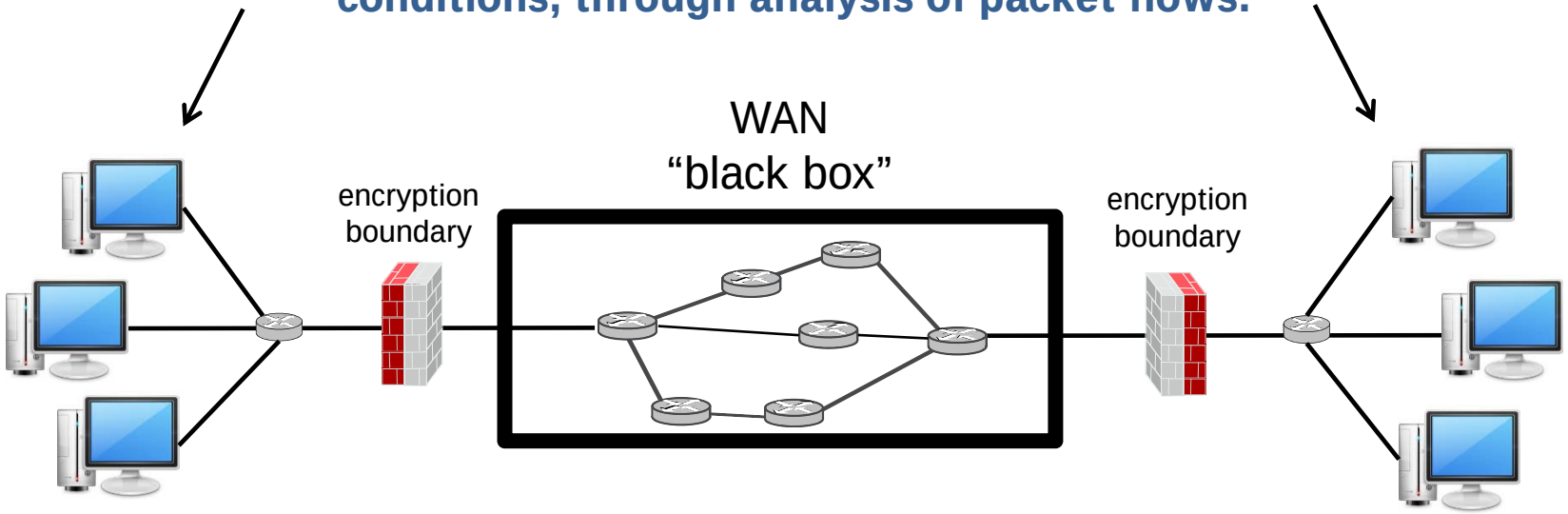


- WAN outage durations exceed missions' tolerance for loss of communication by orders of magnitude
- Recovery from cyber attacks can be even more problematic
- Users have no recourse when disruptions occur
- WAN administrator may have no detailed knowledge of communications requirements of missions, users, or apps
- Users have no situational awareness concerning the nature or extent of disruption

EdgeCT Empowers Hosts and Users at the Edge

Disruptions in the WAN can be overcome by dynamically adapting communications protocols at the edge.

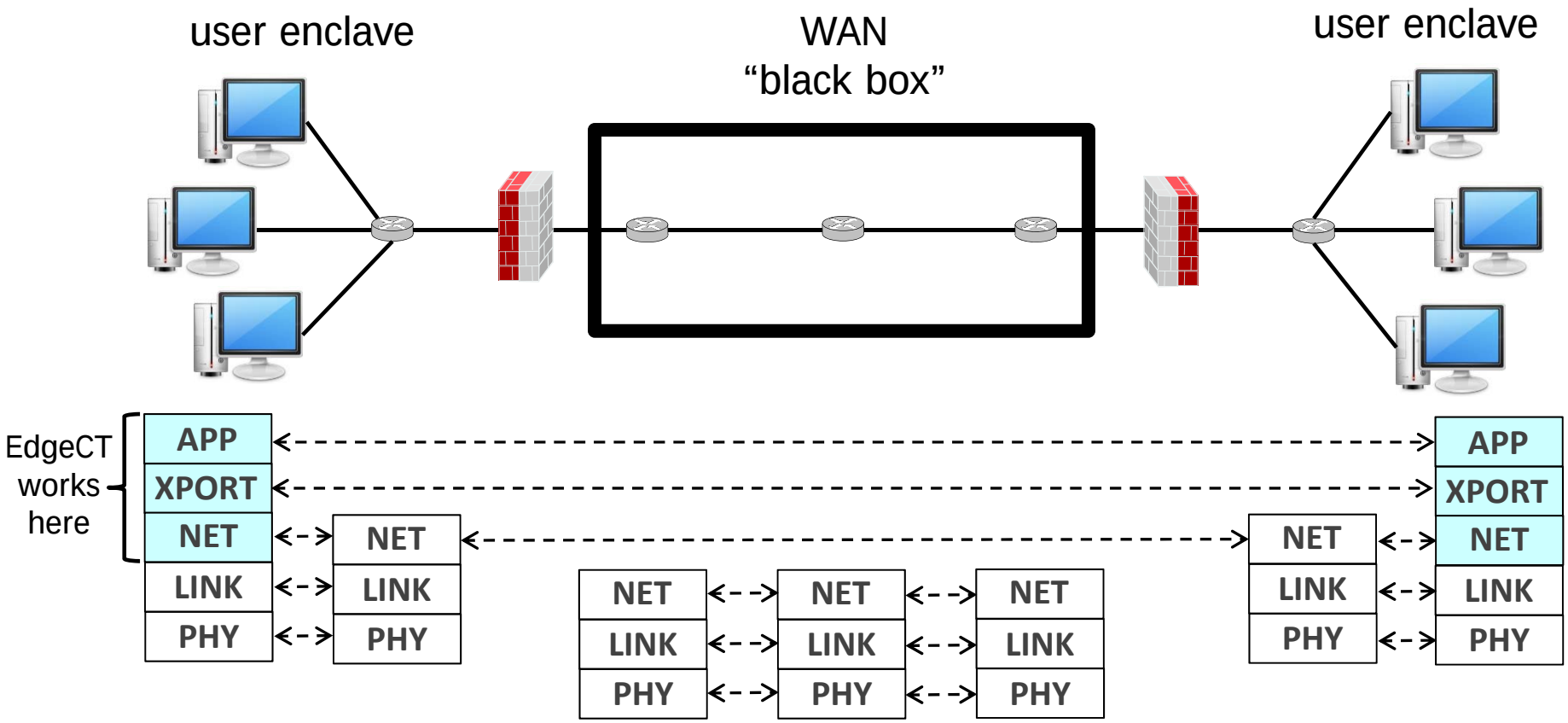
Edge-based, real-time network analytics can enable substantial inference of WAN conditions, through analysis of packet flows.



EdgeCT boosts mission assurance by:

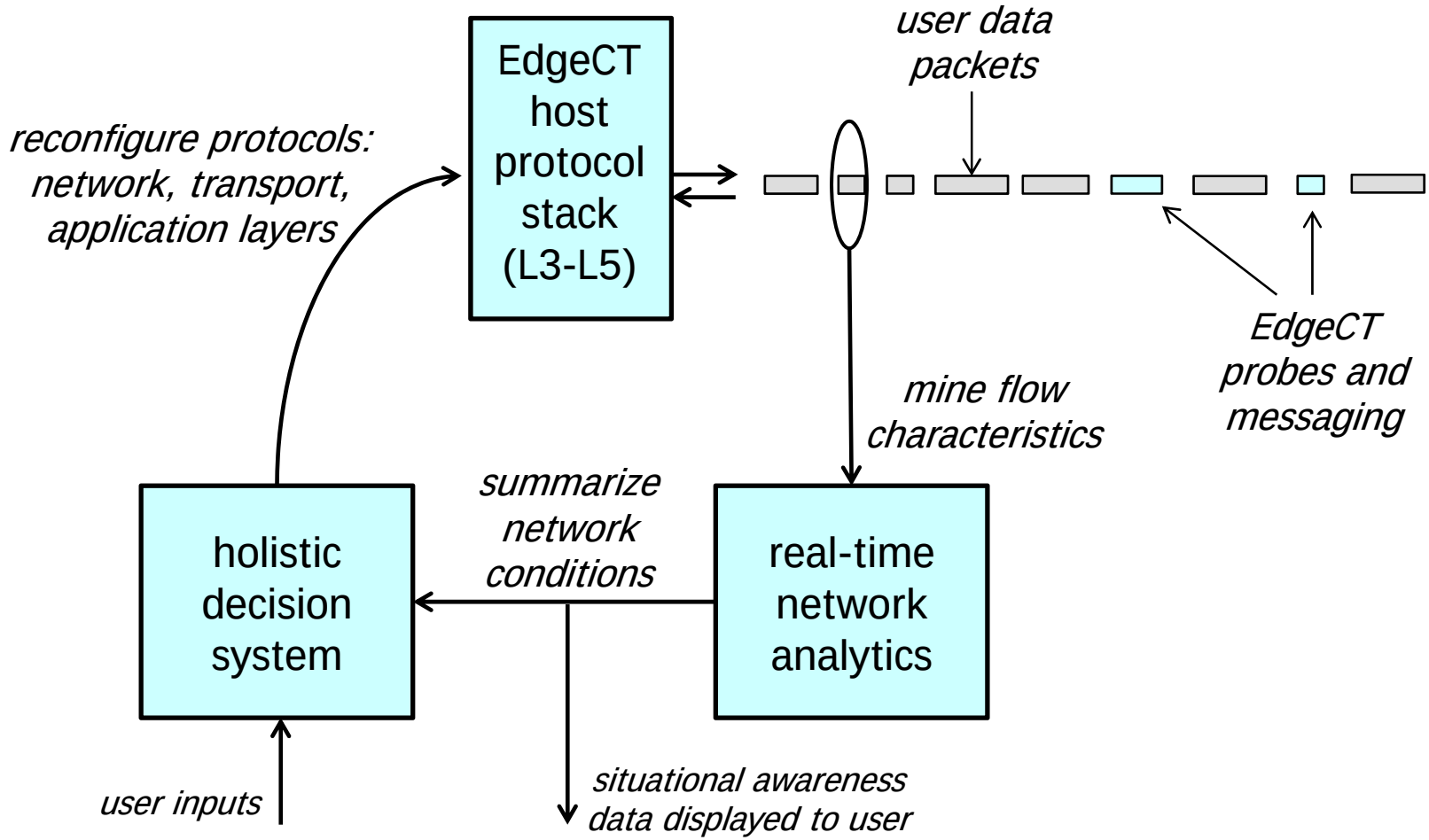
- Mitigating disruptions in ways that don't rely on WAN administrators
- Allowing mission and application awareness to inform mitigation strategy
- Directly providing users with real-time situational awareness of WAN conditions

EdgeCT in the Protocol Stack



- EdgeCT functions may reside on middleboxes (gateways or “bumps in the wire”), on users’ end hosts, or on both
- EdgeCT cannot interact with WAN management or control planes in any way, and cannot necessitate any changes to the WAN

EdgeCT Systems: One Possible Approach



Fully automated, human-on-the-loop, or manual control of operation

EdgeCT Program Technical Areas

Program Track	Responsibilities and Deliverables
Technical Area 1: EdgeCT Systems	• **Teams develop *complete systems* including all components, integration, and demonstrations** • **Deliverables include source code and documentation for components and for full system** • **At least a subset of TA1 performers will participate in military field exercises**
Technical Area 2: Experimental Lead and Evaluator	• **A single performer develops a testbed and instrumentation for use by other program participants** • **Implements increasingly challenging attack and failure scenarios developed in collaboration with TA3** • **Summarizes and verifies performance data from TA1 demonstrations**
Technical Area 3: Voice of the Offense	• **Works with TA1 performers to identify design weaknesses and vulnerabilities** • **Works with TA2 performer to develop military-relevant network architectures, test/usage scenarios, attacks, and failure modes**

EdgeCT Performance Metrics and Testing

Metric	Phase 1	Phase 2
Percent Recovery in Cumulative Network Utility (CNU) compared with what is maximally feasible	60	95
Average Data Flow Recovery Time	60 sec	10 sec
Average Network Overhead per Enclave	10 kb/s or 1%	10 kb/s or 1%

Test Scenario Parameters	Phase 1	Phase 2
Number of Enclaves	6	12
Number of Flows/Tasks per Scenario	1000	10000
Types of Attacks/Failures*	single	multiple

*Example Attack/Failure Types:

- DoS flood of network link(s)
- Shrew attack or similar targeted low-volume DoS
- Disconnection of networked server
- Border Gateway Protocol attack or routing mis-configuration
- Malware on router interface

Metrics: Cumulative Network Utility (CNU)

$$\text{Normalized Cumulative Network Utility (CNU)} = \frac{1}{CNU_o} \sum_{tasks} p_i \, u_i(t_i)$$

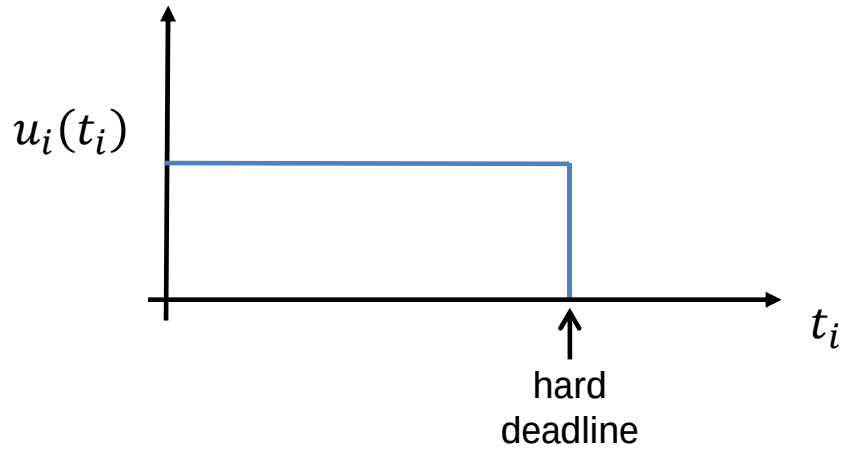
$$CNU_o = maximum\ achievable\ CNU\ value\ during\ network\ event$$

$$p_i = priority\ of\ networking\ task\ i$$

$$u_i(t_i) = utility\ function\ for\ networking\ task\ i$$

$$t_i = completion\ time\ of\ networking\ task\ i$$

Example:



EdgeCT Program Schedule and Milestones

Program Phase	Phase 1																	Phase 2																
Fiscal year	15			16														17									18								
Program Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Kickoff and PI Meetings	◆				◆				◆				◆						◆				◆				◆				◆				◆	
Initial Testbed Operation			◆																																	
Proposed Test Scenarios			◆						◆						◆					◆								◆					◆			
Component Demonstrations						◆			◆			◆																								
Voice of Offense Evaluations				◆						◆								◆						◆						◆						◆
System Demos - Single Event												◆			◆			◆			◆															
System Demos - Multi-Event															◆			◆			◆				◆				◆							◆
Field Exercises																	◆																◆			

- Three year program (assume a start date of 1 July 2015)
- Schedule emphasizes early and frequent testing at component and/or system levels
- Proposals should reflect a three-year base program

Key Points to Remember

- EdgeCT will be a collaborative program
  - No forced down-selects
  - Awardees may have associate contractor agreements included in their contracts
  - Performers within and across TAs are expected to engage with one another openly and constructively
- We want systems that will succeed in real networks
  - BAA lists assumptions about WAN characteristics
  - TA2 experimental platform must offer realistic WAN behavior
- For TA1, we are looking for full systems
  - Be explicit about your plans for integrating and testing your components
- Specifically excluded is research that primarily results in evolutionary improvement to the existing state of practice (per BAA page 4)
- Ensure that the “big picture” of your technical approach is clear up front, and is explained in basic terms
- Read and clearly address the BAA’s evaluation criteria

Break

- The EdgeCT Program Q&A session will begin at 1600.

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Audience Q&A

- EdgeCT Program Q&A Session

www.darpa.mil